22575

PATENT SPECIFICATION

DRAWINGS ATTACHED.

833,038

Date of filing Complete Specification : March 3, 1958.

Application Date : April 12, 1957. No. 11727/57.

Complete Specification Published : April 21, 1960.

Index at Acceptance:—Class 38(5), B2C(3 : 6D : 6X : 17).

International Classification :—H02c.

COMPLETE SPECIFICATION.

Improvements in Electric Switches and Contact Arrangements therefor.

No 95 Law Firm

SPECIFICATION NO. 833,038

INVENTOR:- REGINALD ARTHUR FIRMAN

By a direction given under Section 17(1) of the Patents Act 1949 this application proceeded in the name of Vickers-Armstrongs (Aircraft) Limited, a British Company, of Vickers House, Broadway, Westminster, London, S.W.1.

THE PATENT OFFICE,
March 7, 1960

DS 71190/1(12)/3927 200 2/60 DL

traversed along the face of the other contact to complete a circuit through the same.

Where, in a switch of such type, contact has to be maintained over a certain length of relative movement between the contact elements and then interrupted at a predetermined point, it has hitherto been proposed in certain cases to use as one of the contact elements a spring strip. Where the moving element rotated about a pivot, it was important that the pressure between the elements during contact should be light, in order to minimise the braking effect on the pivotal element and to reduce wear due to friction. Electrical contact resistance is a function of area of contact, and in view of the inevitable irregularities in the surfaces of the contact elements, the greater the area of contact required, the greater must be the load. This load is disadvantageous by reason of the increased braking effect and frictional wear which it entails. If however the contact load is reduced to minimise braking effect, the unevenness of the contacting surfaces of the elements will cause arcing as they pass from one high point to another.

[Price 3s. 6d.]

In a switch of the specified type according to the present invention the foregoing disadvantages are avoided by an arrangement wherein one of the contact elements, conveniently though not necessarily the stationary element, is sub-divided longitudinally into a plurality of members of convex cross-section which are electrically connected but independently supported at each end in a pre-tensioned condition, with capability of individual resilience, so as severally to make virtual point contact with a transversely disposed bar element having a convex contact face.

One embodiment of the invention is diagrammatically illustrated in the accompanying drawing, of which Fig. 1 is a side elevation of the switch showing the operative relationship of the moving and stationary elements, whilst Fig. 2 is a front elevation of the stationary contact-element.

In the drawings, 10 is a holder which is slotted at 101, 101, so that a plurality of lengths of metal wire 11 of convex (i.e. circular) cross-section may be assembled and located as shown, the wires being succes-

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Improvements in Electric Switches and Contact Arrangements therefor.

We, VICKERS-ARMSTRONGS (AIRCRAFT) LIMITED, of Vickers House, Broadway, Westminster, London, S.W.1, a British Company, and REGINALD ARTHUR FIRMAN, of Weybridge Works, Weybridge, Surrey, a British Subject, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

The invention has reference to electric switches of the type in which the respective contacts are constituted by two bar-like elements disposed substantially at right angles to each other, one of such contacts being traversed along the face of the other contact to complete a circuit through the same.

Where, in a switch of such type, contact has to be maintained over a certain length of relative movement between the contact elements and then interrupted at a predetermined point, it has hitherto been proposed in certain cases to use as one of the contact elements a spring strip. Where the moving element rotated about a pivot, it was important that the pressure between the elements during contact should be light, in order to minimise the braking effect on the pivotal element and to reduce wear due to friction. Electrical contact resistance is a function of area of contact, and in view of the inevitable irregularities in the surfaces of the contact elements, the greater the area of contact required, the greater must be the load. This load is disadvantageous by reason of the increased braking effect and frictional wear which it entails. If however the contact load is reduced to minimise braking effect, the unevenness of the contacting surfaces of the elements will cause arcing as they pass from one high point to another, with eventual increased electrical contact resistance.

When in such a switch a spring strip stationary contact is employed, the mechanical follow-up at break due to the sudden relief of spring tension tends to reduce the speed of break and thus tends to draw the arc caused at the break. Where the moving contact element oscillates at high frequency, the resultant bounce of the spring strip is undesirable. Where the contact pressure is maintained by interference between the elements at the time of assembly, the pressure is a function of the interference, which may vary greatly and would be incapable of being detected by checking the continuity of the circuit.

In a switch of the specified type according to the present invention the foregoing disadvantages are avoided by an arrangement wherein one of the contact elements, conveniently though not necessarily the stationary element, is sub-divided longitudinally into a plurality of members of convex cross-section which are electrically connected but independently supported at each end in a pre-tensioned condition, with capability of individual resilience, so as severally to make virtual point contact with a transversely disposed bar element having a convex contact face.

One embodiment of the invention is diagrammatically illustrated in the accompanying drawing, of which Fig. 1 is a side elevation of the switch showing the operative relationship of the moving and stationary elements, whilst Fig. 2 is a front elevation of the stationary contact-element.

In the drawings, 10 is a holder which is slotted at 101, 101, so that a plurality of lengths of metal wire 11 of convex (i.e. circular) cross-section may be assembled and located as shown, the wires being succes-

[*Price* 3*s*. 6*d*.]

sively slid sideways into the slots and retained in position by a keep-plate 102. The end 111 of each wire 11 is bent as shown over a separate member 12, so that when the latter is fixed in position on the holder 10, the parts 11 are pre-tensioned at upper and lower ends. The wires 11 are electrically interconnected at the rear of the holder by suitable means (not shown).

The moving contact-element is a bar 13 disposed substantially at right angles to the length of the wire sections 11. It may be adapted for rectilinear movement in relation to the wire sections 11, or, as in the embodiment illustrated, it may be mounted on an arm 14 which pivots about an axis 15 so that the bar 13 is caused to traverse the parts 112 of said wire sections in the direction of the arrow, bearing against each section individually.

Such an arrangement, which provides virtually point-to-point contact between the contact elements, and wherein the individual sections 11 are free to flex as the bar 13 moves over any irregularities in their surfaces, gives the maximum pressure between the contacts for any given pre-tension, this pressure assisting in maintaining the contact surfaces in a clean condition. The current flowing through the switch is divided between the several sections 11 throughout the stroke of the bar 13, the lower current per section giving a high contact efficiency, and a small arc at break. The arrangement whereby the sections 11 are pre-tensioned at each end facilitates regulation of the contact pressure and, together with the fact that the individual sections 11 are of low mass and constrained by the member 12, tends to avoid bounce at break when the switch is operated at high frequency.

The members 11 of the subdivided element may be so shaped as to provide progressively increased mechanical resistance to the movement across the same of the transversely diposed bar element 13.

WHAT WE CLAIM IS:—

1. A switch of the kind described, in which one of the contact elements is subdivided into a plurality of electrically interconnected individually resilient members each of which is of convex cross-section and is independently supported at its ends, in a pre-stressed condition to permit virtual point contact with the transversely disposed bar element having a convex contact face.

2. A switch according to Claim 1 in which said transversely disposed bar element is pivoted about an axis which is at right angles to the said members.

3. A switch according to Claim 1 in which the members of the subdivided element are shaped to provide progressively increased mechanical resistance to the movement across the same of the transversely disposed bar element.

4. The switch constructed and arranged, substantially as described with reference to the accompanying drawings.

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PROVISIONAL SPECIFICATION.

Improvements in Electric Switches and Contact Arrangements therefor.

We, VICKERS-ARMSTRONGS (AIRCRAFT) LIMITED, of Vickers House, Broadway, Westminster, London, S.W.1, a British Company, and REGINALD ARTHUR FIRMAN, of Weybridge Works, Weybridge, Surrey, a British Subject, do hereby declare this invention to be described in the following statement:—

The invention has reference to electric switches of the type in which the respective contacts are constituted by two bar-like elements disposed substantially at right angles to each other, one of such contacts being traversed along the face of the other contact to complete a circuit through the same.

Where, in a switch of such type, contact has to be maintained over a certain length of relative movement between the contact elements and then interrupted at a predetermined point, it has hitherto been proposed in certain cases to use as one of the contact elements a spring strip the width of which provides a sufficient area to carry the current. In the case of a switch in which the moving element rotates about a pivot, it is important that the pressure between the elements during contact shall be light, in order to avoid imposing a braking resistance to the pivotal element and also causing wear due to friction. Electrical contact resistance is a function of area of contact, and in view of the inevitable irregularities in the surfaces of the contact elements, the greater the area of contact which is required, the greater must be the pressure between said elements, but this is disadvantageous by reason of the increased braking resistance and frictional wear which it entails. If the contact pressure is reduced to avoid braking resistance, the unevenness of the stationary element over which the moving element slides will cause arcing as the latter element

passes from one high point to another, with eventual increased electrical contact resistance.

When in such a switch a spring strip stationary contact is employed, the mechanical follow-up at break due to the sudden relief of spring tension tends to reduce the speed of break and thus tends to draw the arc caused at the break. Where the moving contact element oscillates at high frequency, the resultant bounce of the spring strip would be undesirable. Where the contact pressure is maintained by interference between the elements at the time of assembly, the pressure is a function of the interference, which may vary greatly and would be incapable of being detected by checking the continuity of the circuit.

In a switch of the specified type according to the present invention the foregoing disadvantages are avoided by an arrangement wherein one of the switch elements, conveniently though not necessarily, the stationary element, is sub-divided longitudinally into a plurality of members of convex cross-section which are electrically connected but independently supported at each end in a pretensioned condition, with capability of individual resilience, so as severally to make virtual point-to-point contact with a transversely disposed bar element having a convex contact face.

One embodiment of the invention is diagrammatically illustrated in the accompanying drawing, of which:—

Fig. 1 is a front elevation of the stationary contact-element; and

Fig. 2 a side elevation showing the operative relationship of the moving and stationary elements.

In the drawings, 10 is a holder which is slotted at 101, 101, so that a plurality of lengths of metal wire 11 may be assembled and located as shown. The end 111 of each wire 11 is shaped as shown over a separate member 12, and when the latter is fixed in position on the holder 10, the parts 11 are pre-tensioned at upper and lower ends.

The moving contact-element is a bar 13 disposed substantially at right angles to the length of the wire sections 11 and mounted on an arm 14 which pivots about an axis 15 so that the bar 13 is caused to traverse the parts 112 of said wire sections in the direction of the arrows, bearing against each section individually.

Such an arrangement, which provides virtually point-to-point contact between the switch elements, and wherein the individual sections 11 of the stationary switch element are free to flex as the bar 13 moves over any irregularities in their surfaces, gives the maximum pressure between the contacts with the minimum degree of frictional resistance, whilst the traversing action assists in maintaining the contact surfaces in a clean condition. The current flowing through the switch is divided between the several component sections 11 throughout the stroke of the bar 13; the low current at constant voltage per section giving a high contact efficiency, and a small arc at break. The arrangement whereby the sections 11 are pre-tensioned at each end facilitates regulation of the contact pressure and, together with the fact that the individual sections 11 are of low mass, it tends to avoid bounce at break when the switch is operated at high frequency.

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Abingdon: Printed for Her Majesty's Stationery Office, by Burgess & Son (Abingdon), Ltd.—1960.
Published at The Patent Office, 25, Southampton Buildings, London, W.C.2,
from which copies may be obtained.

833,038 PROVISIONAL SPECIFICATION
1 SHEET

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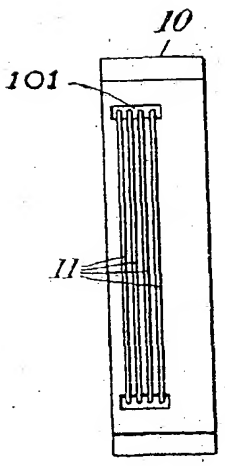

Fig. 1.

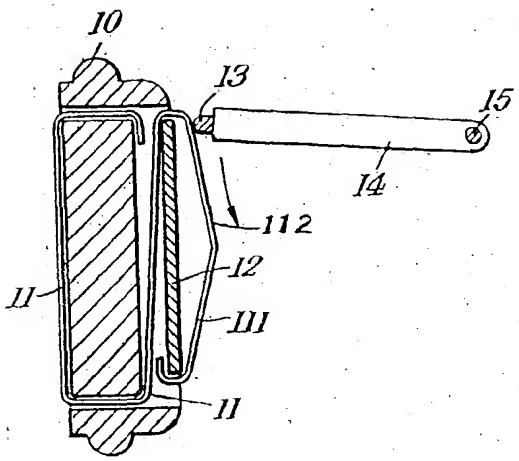

Fig. 2.

833,038 COMPLETE SPECIFICATION
1 SHEET

This drawing is a reproduction of the Original on a reduced scale.

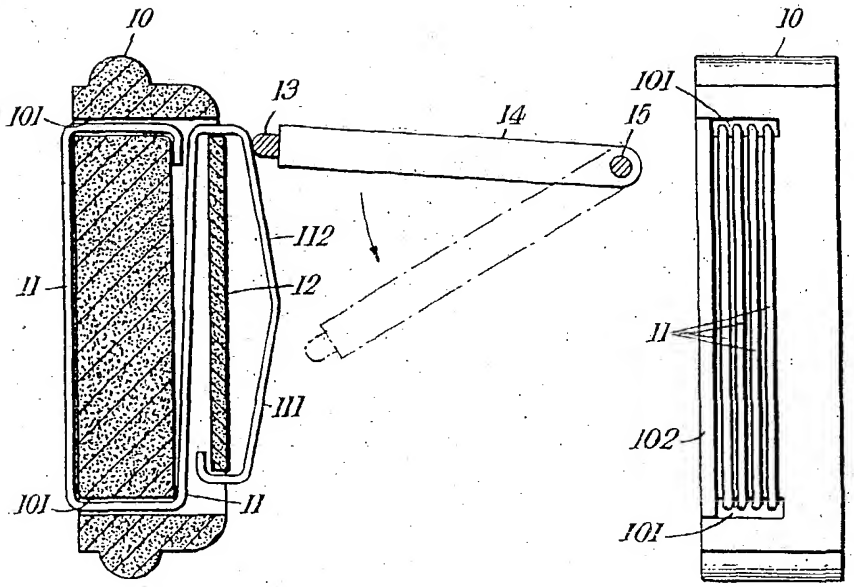

Fig. 1.

Fig. 2.